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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	BENJAMIN M. CAHILL	§	Group Art Unit:	2674
Serial No.:	09/703,162	§	Examiner:	Abbas L. Abdulselam
Filed:	October 31, 2000	§		
For:	ANALYZING ALPHA VALUES FOR FLICKER FILTERING	§	Atty. Dkt. No.:	INTL-0438-US (P9450)

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

Applicant respectfully appeals from the final rejection mailed August 8, 2003.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee Intel Corporation, the assignee of the present application by virtue of the assignment recorded at Reel/Frame 011269/0515.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF THE CLAIMS

The application was originally filed with claims 1-22. Claims 1-22 are pending. Claims 1-22 are the subject of this appeal.

IV. STATUS OF AMENDMENTS

No amendments have been filed since the Final Rejection.

Date of Deposit: January 6, 2004
I hereby certify under 37 CFR 1.8(a) that this correspondence is being deposited with the United States Postal Service as **first class mail** with sufficient postage on the date indicated above and is addressed to the Mail Stop Appeal Brief-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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V. SUMMARY OF THE INVENTION

In accordance with embodiments of the present invention, a flicker filter is adjusted when certain alpha blending operations occur. The operations specify the strength of a graphics signal to be displayed simultaneously with a video signal. For some weakly showing graphics signals, the flicker filter may be turned off entirely.

In Figure 1, a system 100 includes a processor 10 connected to a system bus 12, according to one embodiment. The system 100 may be any of a variety of processor-based systems, including a personal computer, an Internet appliance, a set-top box, and so on.

A multi-function bridge 22 is connected to the system bus 12. The bridge 22 may itself include memory control functions. In one embodiment, the bridge 22 interfaces to a system memory 40 as well as a flash/ROM 18. In one embodiment, the bridge 22 is further connected to a peripheral component interconnect (PCI) bus 24. The system 100 further includes a graphics controller 14, coupled to the PCI bus 24.

A video signal 38 may be received into the system 100 through a cable or other connector IN 30. In one embodiment, the video signal 38 is received into a tuner/capture device 28, which converts radio frequency (RF) signals into baseband composite video, for receipt by a video decoder 26. The video decoder 26 decodes the baseband video signal and digitizes the signal into luma and chroma components. The components may then be received into the graphics controller 14 using a dedicated video port. The graphics controller 14 may send the components into a graphics memory 16, also known as a frame buffer memory 16. See Specification, pp. 3-4.

In one embodiment, the graphics controller 14 produces graphics signals. The internally generated graphics signal may be mixed with the incoming video signal, such as in a video mixer or an overlay, for example (not shown).

Increasingly, analog video signals from an external source are combined with graphics signals typically created within the set-top box, or other processor-based system, before being displayed. For example, a graphics image may be superimposed on a video image such that both are visible simultaneously. Some television networks, for example, display an identification icon in the lower right-hand corner of the television display while a program is broadcast. The graphics icon is typically transparent enough that the video image is not disturbed. See Specification, pp. 4-6.

Television displays expect incoming signals to be interlaced. That is, an odd field of the video signal 42 is received, followed by an even field, and so on. The television display raster includes hundreds of scan lines. When the odd field is received, the television monitor 20 displays the odd scan lines; when the even field is received, the television monitor 20 receives the even scan lines. The television monitor 20 receives these odd and even fields several times each second.

Particularly for still images, interlaced display of graphics signals may cause a noticeable flicker of the image. A flicker results when part of the image occupies a single scan line, such as an image having thin, horizontal lines. In Figure 2, for example, a text letter "A" occupies a number of scan lines 52 of a display 50. The scan lines 52 include odd scan lines 52o and even scan lines 52e.

In Figure 3A, the odd scan lines 52o of the "A" are sent to the display 50. In this image, the horizontal line 60 of the "A," in scan line 54, is visible. In Figure 3B, however, only the even

scan lines 52e of the display 50 receive signal information. Now, the horizontal line 60 is not visible. Accordingly, displaying the image of Figure 3A, followed rapidly by the image of Figure 3B, produces flicker.

To address this phenomenon, a flicker filtering operation may be performed on the signal to be displayed, typically from within the graphics controller 14. Flicker filtering blends pixels from scan lines of a given field with adjacent scan lines from one or more opposite fields. The blending reduces flicker caused by small graphics detail, such as the single horizontal line 60. Where originally the small detail appears in only one field, the flicker filtering makes the detail "appear" in both fields. See Specification, pp. 6-7.

One method of flicker filtering is to employ a filter such as a finite impulse response (FIR) filter. Some flicker filters include the ability to adjust the FIR filter, for example, by increasing the number of taps, or by adjusting the weight of each tap. The FIR flicker filter thus may include multiple levels or strengths.

While flicker filtering may mitigate the flickering effects of interlaced graphics, flicker filtering also may disturb motion video such as a movie or television program. After flicker filtering, the static video detail of a movie may be blurred. Further, because flicker filter uses information from an adjacent field, images from two different instances in time may "appear" on the display simultaneously, blurring the image in time. Such is particularly evident in moderately fast horizontal pans or in action-oriented scenes. See Specification, pp. 7-8.

According to one embodiment, flicker filtering is adjusted according to the "strength" of the graphics image being displayed. In other words, an assessment of the degree of alpha blending is made. The strength of the graphics image may be identified by the alpha value. A weakly showing, or more transparent, graphics image typically will not generate enough contrast

in the combined image to induce a perception of flicker. Because flicker filtering may disturb the underlying video image, where a somewhat transparent graphics image is being displayed, the flicker filter is turned off.

In one embodiment, an eight-bit alpha value specifies the strength of a graphics image to be displayed simultaneously with a video image, for a total of two hundred and fifty-six possible "strengths." A flicker filter likewise may include eight levels of flicker filtering, according to one embodiment.

In Figure 5, a table relates alpha values to the flicker filter levels, according to one embodiment. Alpha values from 0-32 result in flicker filter level 0, or no flicker filter, alpha values 33-40 result in flicker filter level 1, and so on. Alpha values 91-255 invoke the highest flicker filter level, level 7, according to one embodiment. In the mid-range, the flicker filter level increases for every eight increments of the alpha value. The "alpha step size" is thus eight for this flicker filter. An alpha value of 33 represents a threshold, below which no flicker filtering is performed.

Because some transparent graphic images do not induce enough flicker to justify flicker filtering, in one embodiment, the system 100 monitors the alpha value and adjusts the flicker filter level, as needed, for low alpha values. The operation of monitoring and adjusting, according to one embodiment, is depicted in the flow diagram of Figure 6. See Specification, pp. 8-9.

The alpha value associated with the current image being sent to the display is compared to a predefined threshold value (diamond 82). In one embodiment, this threshold value is empirically determined to be the alpha value below which no flicker filtering is to be performed.

In a second embodiment, the threshold value is not predetermined, but is based upon an evaluation of the image prior to being displayed.

Where the alpha value does not exceed the predetermined threshold value (the "no" prong of diamond 82), in one embodiment, the flicker filter is turned off, or set to level "0" (block 84), and no flicker filtering is performed. Where the alpha value exceeds the predetermined threshold value (or is identical to same), however, the flicker filter may nevertheless be adjusted. For example, in one embodiment, a calculation for a new flicker filter level is performed (block 86).

Once a new filter level is calculated, the level is compared to a value corresponding to the highest flicker filter level (diamond 88). If the calculated filter level exceeds the highest level of the flicker filter, the filter level is simply set to the highest level of the flicker filter (block 90). Otherwise, the flicker filter level is adjusted according to the calculation (block 92). See Specification, pp. 9-10.

In Figure 6, the predetermined threshold value is subtracted from the current alpha value. The result is divided by the alpha step size for a whole number result. A constant value of 1 is added to the whole number result. The formula is one of many possible calculations that may be performed, which relates the filter level to the alpha value. Alternatively, a lookup table may be employed which associates alpha values with the new filter levels.

A table associating the alpha values with the adjusted flicker filter levels, based upon the formula used in Figure 6, is depicted in Figure 7, where the alpha step size is 8 and the predetermined threshold value is 81. The eight available flicker filter levels are still invoked, but for higher alpha values, as shown.

Thus, according to the embodiments described herein, a flicker filter is adjusted based upon the strength of the graphics image to be displayed simultaneously with a video image. In one embodiment, a comparison between the alpha values and a predetermined threshold value is used to calculate the new flicker filter levels. For sufficiently low alpha values corresponding to transparent graphics images, the flicker filter is turned off entirely, in some embodiments. Accordingly, flicker filtering which is not beneficial for the graphics image is not performed, and adverse affects to the video image are avoided. See Specification, p. 10.

VI. ISSUES

A. Are Claims 1, 10-14, 16, and 17 Patentable Under 35 U.S.C. §103(a) Over Gloudemans In View of Cheung?

B. Are Claims 5-7 and 21 Patentable Under 35 U.S.C. §103(a) Over Gloudemans In View of Cheung?

C. Are Claims 2-3, 9, 18-19, and 22 Patentable Under 35 U.S.C. §103(a) Over Gloudemans In View of Cheung and In Further View of Young?

D. Are Claims 4 and 20 Patentable Under 35 U.S.C. §103(a) Over Gloudemans In View of Cheung and In Further View of Young?

E. Are Claims 8 and 15 Patentable Under 35 U.S.C. §103(a) Over Gloudemans In View of Cheung and In Further View of Young?

VII. GROUPING OF THE CLAIMS

The claims do not stand or fall together. For purposes of this appeal, Applicant has grouped together claims 1, 10-14, 16, and 17; claims 5-7 and 21; claims 2-3, 9, 18-19, and 22; claims 4 and 20; and claims 8 and 15, as set forth above.

VIII. ARGUMENT

A. Claims 1, 10-14, 16, and 17 Are Patentable Under 35 U.S.C. §103(a) Over Gloudemans In View of Cheung

Claim 1 recites a method including receiving an alpha value indicating how a video signal and a graphics signal are to be combined; and adjusting a flicker filter based upon the alpha value. Claims 1, 10-14, 16 and 17 stand rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,266,100 B1 (Gloudemans) in view of U.S. Patent No. 6,538,656 (Cheung). This rejection is improper.

With regard to claim 1, the Examiner concedes that "Gloudemans [sic] does not disclose adjusting a flicker filter based upon the alpha value" as recited by claim 1. Final Office Action, p. 2. Instead, the Examiner relies on Cheung for such a teaching, stating that "it would have been obvious…to modify Gloudemans' video presentation to adapt Cheung's anti-flutter filtering (98) and a video scaler (104) activities as represented in FIG. 4." Final Office Action, p. 3. The Examiner further states that Cheung suggests that "filtering along with video scaling provides the desired method of adjusting a flicker filter." Id.

Applicant respectfully disagrees. With respect to Cheung, there is no teaching or suggestion for "adjusting a flicker filter based upon the alpha value" as recited by claim 1. That is, Cheung does not adjust a flicker filter based on an alpha value. To the extent that the Examiner contends that filter (98) is a flicker filter, there is no teaching or suggestion in Cheung that such a filter is adjusted based on an alpha value. Instead, filter (98) of Cheung has coefficients that are samples of an approximately continuous impulse response. Cheung, 9:52-10:4. This in no way teaches or suggests adjusting a flicker filter by an alpha value.

Further, the video scaler (104) of Cheung has no interaction with the output of filter (98). As shown in FIG. 4 of Cheung, these separate components are in no way connected. Thus,

contrary to the Examiner's contention, Cheung does not perform "anti-flutter filtering in conjunction with a video scaler." Final Office Action, p. 3. Nor does the video scaler (104) teach or suggest adjusting a flicker filter based upon an alpha value. In contrast, the scaler function of the video scaler (104) is a set of sample rate conversion functions: it is not adjusted based on an alpha value. Cheung, 10:27-41.

Furthermore, the Examiner contends in the Advisory Action that:

> Cheung discloses (Fig. 30) blending video windows (964) and graphic windows (968) such that alpha blending each window with a window behind it is possible, and the alpha value can be adjusted for every pixel, wherein by controlling the alpha blend function, one can reduce flutter effect. See col. 50, lines 64-67.

Advisory Action, page 2. However, such teaching in Cheung does not teach or suggest the missing element of adjusting a flicker filter based upon an alpha value. In fact, this portion of Cheung teaches away from such a flicker filter, as Cheung teaches that "while it is also possible to include filters in hardware to minimize visible flutter of the display, such filters are costly in that they require higher memory bandwidth from the display memory...and they tend to require additional logic and memory on chip." Cheung, col. 50, lines 28-34. Thus the entirety of Cheung teaches away from usage of a flicker filter, and it certainly does not teach or disclose adjusting a flicker filter based upon an alpha value.

Nor is there any motivation or suggestion to combine Gloudemans with Cheung. This is especially so, as Gloudemans relates to a system for enhancing video presentation of a live event using a graphic, whereas Cheung relates to an integrated circuit for receiving and processing video and graphics information as used in a set top box.

Thus claim 1 patentably distinguishes over the proposed combination. Independent claim 10 and claims 11-14 and 16 depending therefrom, and independent claim 17 are patentable for the same reasons, and the rejection should be reversed.

B. Claims 5-7 and 21 Are Patentable Under 35 U.S.C. §103(a) Over Gloudemans In View of Cheung

Dependent claim 5 depends from claim 2 and further recites turning off the flicker filter when a predetermined threshold value exceeds the alpha value. Claims 5-7 and claim 21 stand rejected under §103(a) over Gloudemans in view of Cheung. In addition to the reasons set forth in VIII.A above, dependent claims 5-7 and 21 are further patentable, as they depend from claims 2 and 18, respectively, which are not rejected over the combination of Gloudemans and Cheung. In this regard, the Examiner concedes that neither Gloudemans or Cheung teach or suggest comparing an alpha value to a predetermined threshold value (*see* Final Office Action, p. 4), recited by both claims 2 and 18 from which dependent claims 5-7 and 21 depend. Thus for this further reason, the rejection is improper, and these claims are patentable.

C. Claims 2-3, 9, 18-19, and 22 Are Patentable Over Gloudemans Under 35 U.S.C. §103(a) In View of Cheung and In Further View of Young

Dependent claim 2 depends from claim 1 and further recites comparing the alpha value to a predetermined threshold value to arrive at a result; and adjusting a filter level of the flicker filter in response to the result. Claims 2-3, 9, 18-19, and 22 stand rejected over Gloudemans in view of Cheung and in further view of U.S. Patent No. 6,144,365 (Young). For the same reasons discussed above with regard to claim 1 (see VIII.A), this rejection is improper.

The rejection of claim 2 is further improper, as Young does not teach or suggest comparing an alpha value to a predetermined threshold value. In this regard, Young does not teach or suggest an alpha value that "indicates how a video signal and a graphics signal are to be combined." *See* claim 1. Instead, the alpha value of Young relates solely to graphics images and the blending of two graphics pixels (and more specifically, colors thereof) as a foreground and background pixel. Young, 1:22-52.

Further, the comparison in Young of an alpha value to a threshold is not used in any manner to adjust a filter level of a flicker filter. Instead, Young merely teaches that such a comparison is performed to determine whether to reject a pixel without further processing. Young, col. 5, lines 10-22. For this further reason, claim 2 and claim 3 depending therefrom are patentable over the combination and the rejection should be reversed. For similar reasons, claims 9 and 18, 19 and 22 are patentable and the rejection should be reversed.

D. Claims 4 and 20 Are Patentable Under 35 U.S.C. §103(a) Over Gloudemans In View of Cheung and In Further View of Young

Claim 4 depends from claim 3 (which itself depends from claim 2) and further recites dividing a second result (obtained from subtracting an alpha value from a threshold value) by an alpha step value to arrive at a third result; and adjusting the filter level based on the third result. Claim 4 stands rejected under 35 U.S.C. § 103(a) over Gloudemans in view of Cheung in further view of Young. For the same reasons discussed above regarding claim 2 (see VIII.C), this rejection is improper.

The rejection of claim 4 is further improper, as Young does not teach or suggest providing a second result (obtained by subtracting an alpha value from a threshold) by an alpha step value to arrive at a result that is then used to adjust a filter level. In this regard, the fact that Young has an alpha blending unit that includes an adder, subtracter, multiplier and divider nowhere teaches or suggests using such components for comparisons with alpha values, threshold values or alpha step values. Nor does Young teach or suggest using its alpha test unit (306), Z compute unit (308) or alpha blending unit (310) to adjust a filter level of a flicker filter. For these further reasons, claim 4 is patentable. For the same reason claim 20 is patentable, and the rejection should be reversed.

E. Claims 8 and 15 Are Patentable Under 35 U.S.C. §103(a) Over Gloudemans In View of Cheung and In Further View of Young

Claim 8 depends from claim 3 and further recites turning off the flicker filter when the graphics image displayed with the video image has an alpha value below a predetermined threshold value. Claims 8 and 15 stand rejected under §103(a) over Gloudemans in view of Cheung and in further view of Young. None of the references teach or suggest turning off a flicker filter when a graphics image has an alpha value below a threshold. As conceded by the Examiner, neither Gloudemans nor Cheung teach or suggest comparison of an alpha value to a threshold. Nor does Young teach or suggest any adjustment to a filter level based on such a comparison. For this additional reason (and the reasons discussed above regarding claim 2 (see VIII.C)), the rejection should be reversed.

IX. CONCLUSION

Since the rejections of the claims are baseless, they should be reversed.

Respectfully submitted,

Date: January 6, 2004

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<u>APPENDIX OF CLAIMS</u>

The claims on appeal are:

1. A method comprising:

receiving an alpha value, wherein the alpha value indicates how a video signal and a graphics signal are to be combined; and

adjusting a flicker filter based upon the alpha value.

2. The method of claim 1, further comprising:

comparing the alpha value to a predetermined threshold value to arrive at a result; and

adjusting a filter level of the flicker filter in response to the result.

3. The method of claim 2, further comprising:

subtracting the alpha value from the predetermined threshold value to arrive at a second result.

4. The method of claim 3, further comprising:

dividing the second result by an alpha step value to arrive at a third result; and

adjusting the filter level based on the third result.

5. The method of claim 2, further comprising:

turning off the flicker filter when the predetermined threshold value exceeds the alpha value.

6. The method of claim 2, further comprising:

adjusting the filter level when the alpha value exceeds the predetermined threshold value.

7. The method of claim 2, further comprising:

turning off the flicker filter when the graphics image displayed with the video image is substantially transparent.

8. The method of claim 3, further comprising:

turning off the flicker filter when the graphics image displayed with the video image has an alpha value that is below the predetermined threshold value.

9. The method of claim 1, further comprising:

evaluating the graphics signal to produce a threshold value;

comparing the alpha value to the threshold value to arrive at a result; and

adjusting a filter level of the flicker filter in response to the result.

10. A system comprising:

a controller to associate an alpha value with a signal to be displayed; and

a processor coupled to the controller to execute a software program which includes instructions to enable the system to adjust a flicker filter based upon the alpha value.

11. The system of claim 10, wherein the flicker filter operates at a plurality of levels.

12. The system of claim 11, wherein the software program further includes instructions to enable the system to:

compare the alpha value to a predetermined threshold value to produce a result; and

adjust one of the plurality of levels of the flicker filter based upon the result.

13. The system of claim 10, wherein the signal is a mixed video and graphics signal.

14. The system of claim 13, wherein the alpha value specifies how strongly the graphics signal is to be displayed.

15. The system of claim 12, wherein the flicker filter is turned off when the predetermined threshold value exceeds the alpha value.

16. The system of claim 11, wherein the software program further includes instructions to enable the system to:

evaluate the signal to produce a threshold value;

compare the alpha value to the threshold value to produce a result; and

adjust one of the plurality of levels of the flicker filter based upon the result.

17. An article comprising a medium storing instructions that, upon execution, enable a processor-based system to:

receive an alpha value, wherein the alpha value indicates how a video signal and a graphics signal are to be combined; and

adjust a flicker filter based upon the alpha value.

18. The system of claim 11, wherein the software program further includes instructions to enable the system to:

evaluate the signal to produce a threshold value;

compare the alpha value to the threshold value to produce a result; and

adjust one of the plurality of levels of the flicker filter based upon the result.

19. The article of claim 18, further storing instructions that, upon execution, enable the processor-based system to subtract the alpha value from the predetermined threshold value to arrive at a second result.

20. The article of claim 19, further storing instructions that, upon execution, enable the processor-based system to:

divide the second result by an alpha step value to arrive at a third result; and

adjust the filter level based on the third result.

21. The article of claim 18, further storing instructions that, upon execution, enable the processor-based system to:

turn off the flicker filter when the predetermined threshold value exceeds the alpha value.

22. The article of claim 18, further storing instructions that, upon execution, enable the processor-based system to:

adjust the filter level when the alpha value exceeds the predetermined threshold value.